SolarEdge Safety & Monitoring Interface (SMI-180) Installation Guide

Version 1.1

Disclaimers

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This equipment has been tested and found to comply with the limits applied by the local regulations. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

Support and Contact Information

If you have technical problems concerning our products, please contact us:

Country	Phone	E-Mail
Australia	1800 465 567	support@solaredge.net.au
APAC (Asia Pacific)		support-asia@solaredge.com
Belgium	080073041	support@solaredge.be
France	0800917410	support@solaredge.fr
Germany	+49 89-45459730	support@solaredge.de
Italy	800 784 824	support@solaredge.it
Japan	+81.3.5530.9360	support@solaredge.jp
US & Canada	1 877 360 5292	ussupport@solaredge.com
United Kingdom	0800 028 1183	support@solaredge.uk
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Israel	+972 73 240-3118	
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United Kingdom	0800 028 1183	
Worldwide	+972 73 240-3118	
Fax	+972 73 240-3117	

Before contact, make sure to have the following information at hand:

- Inverter and power optimizer model.
- Serial number of the product in question.
- The error indicated on the inverter screen or on the SolarEdge monitoring portal, if there is such an indication.
- System configuration information, including the type and number of modules connected and the number and length of strings.
- The communication method to the SolarEdge server, if the site is connected.
- The software version as appears in the ID status (see *ID Status* on page 39).

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HANDLING AND SAFETY INSTRUCTIONS

During installation, testing and inspection adherence to all the handling and safety instructions is mandatory.

SAFETY SYMBOLS

The following safety symbols are used in this document. Familiarize yourself with the symbols and their meaning before installing or operating the system.

WARNING!

Denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in **injury or loss of life**. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.

CAUTION!

Denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in **damage or destruction of the product**. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

NOTE

Denotes additional information about the current subject.

IMPORTANT SAFETY FEATURE

Denotes information about safety issues.

IMPORTANT SAFETY INSTRUCTIONS

WARNING!

Do not remove the SMI cover before five minutes have elapsed after disconnecting all sources of power.

WARNING!

Before operating the SMI, ensure that the has been grounded properly.

WARNING!

Opening the SMI and repairing or testing under power must be performed only by qualified service personnel familiar with the SMI.

WARNING!

The SMI is designed to work in conjunction with non-SolarEdge inverters and with SolarEdge power optimizers equipped with the IndOp™ technology. It will NOT work with the SolarEdge fixed string voltage mode. Therefore, string lengths and system design must comply with the inverter design guidelines. SolarEdge extended string lengths are not applicable. Designing outside of the inverter design rules may result in permanent damage to the SMI.

WARNING!

If the photovoltaic array is exposed to light, it supplies DC voltage to the power optimizers.

CAUTION!

This unit must be operated under the specified operating conditions as described in the *Technical Specifications*, or the latest technical specification datasheet, available on the SolarEdge website at http://www.solaredge.com/groups/products/overview.

NOTE

The following warning symbols appear on the SMI warning label:

Risk of electric shock

Risk of electric shock from energy stored in the capacitor. Do not remove cover until 5 minutes after disconnecting all sources of supply.

Refer to the product documentation

General hazard

NOTE

Use PV modules rated according to IEC 61730 class A.

NOTE

The symbol appears at grounding points on the SolarEdge equipment. This symbol is also used in this manual.

Chapter 1: Introducing the SMI-180

Safety and Monitoring Interface for Large Scale Installations

When connecting SolarEdge power optimizers to a non-SolarEdge inverter, the SolarEdge safety and monitoring interface for large scale installations (SMI) enables the following features:

1. Safety functions of the power optimizers
2. Communication of the module-level data sent from the power optimizers to the SolarEdge monitoring portal.

SolarEdge offers also the monitoring interface (MI) , which includes only the second feature above.

The SMI supports the SolarEdge optimizer SafeDC™ feature. The SafeDC™ mechanism automatically shuts down module voltage whenever the grid power is shut down, thus providing greater safety during installation, maintenance and firefighting.

The SMI is installed between the SolarEdge power optimizers and a non-SolarEdge inverter, and is compatible with any on-grid inverter.

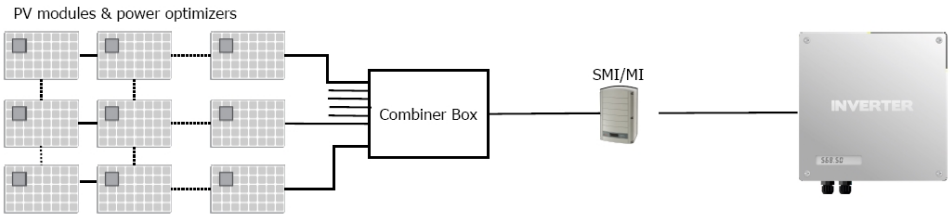


Figure 1: The SolarEdge safety and monitoring interface for large scale installations (SMI) connected in a PV system

Figure 2: The SolarEdge safety and monitoring interface (SMI) for large scale installations

The SMI External Interfaces

The following shows the SMI connectors and interfaces:

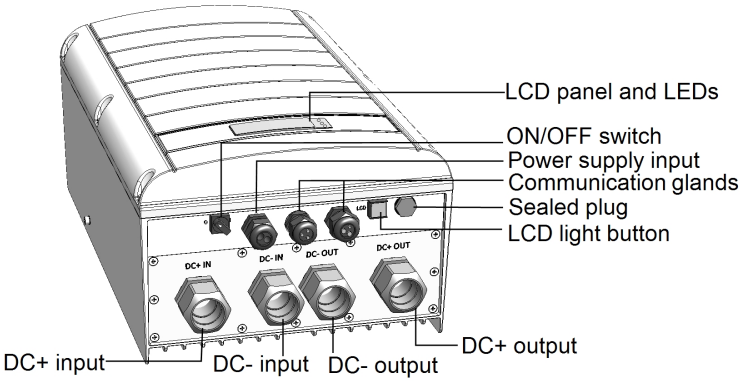


Figure 3: SMI interfaces

- **ON/OFF Switch**: Turning this switch ON (1) starts the operation of the power optimizers. Turning it OFF (0) reduces the power optimizer voltage to a low and safe value. In the MI this functionality is disabled.
- **LCD Light Button**: Pressing this button lights up the LCD for 30 seconds. In addition, you can press this button to access configuration menu options, as described in *Configuring the SMI Using the LCD Light Button* on page 33.
- **Two Communication Glands**, for connection of communication options. Refer to *Setting Up Communication* on page 42.
- **Power supply input**: Used to connect the SMI to an auxiliary power supply unit.
- **LCD panel**: displays SMI information and configuration parameters
- **LCD LEDs**: Three LEDs indicate the following SMI statuses:

Color	Description	Functionality
Green	Power OK	Indicates whether the SMI is connected to power.
Yellow	Module Communication	Blinking when monitoring information is received from a power optimizer.
Red	Fault	Indicates that there is an error. Refer to *Errors and Troubleshooting* on page 53 for more information. In addition, this LED blinks while the SMI is being shut down.

All LEDs are on while the SMI is being configured.

The SMI Internal Interfaces

As part of the installation and configuration process, accessing the internal components of the SMI may be required. This involves removing the cover of the SMI.

Opening and Closing the SMI Cover

To remove the SMI cover:

1. Turn the ON/OFF switch to OFF.
2. Disconnect the power to the SMI:
   a. Turn OFF the inverter
   b. Turn OFF the PSU. Wait 5 minutes for the inverter and SMI capacitors to discharge.
3. Open the cover's six Allen screws and carefully remove the cover.

CAUTION!

When removing the cover, make sure not to damage internal components. SolarEdge will not be held responsible for any components damaged as a result of incautious cover removal.

To close the SMI cover:

Attach the cover and secure it by tightening the screws with a torque of 4.0 N*m/ 2.9 lb*ft. For proper sealing, first tighten the corner screws and then the two central screws. The following figure illustrates the recommended order:

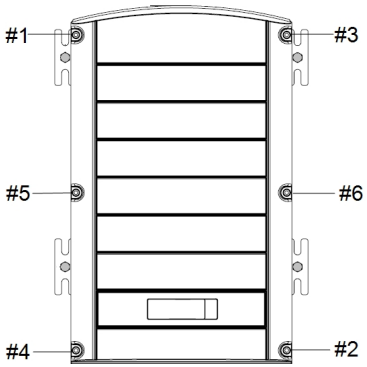


Figure 4: Tightening order of the screws

Accessing the Internal Compartments

The SMI is divided into two compartments by a plate. The top compartment on the plate includes the communication board, the LCD screen and user buttons, the power supply connector and communication connectors. The lower compartment includes the DC input and output connections. The lower compartment is accessed by lifting the plate which is hinged to the SMI enclosure.

To access the lower compartment:

1. Loosen the two screws on the left side of the internal plate.
2. Carefully lift the internal plate.

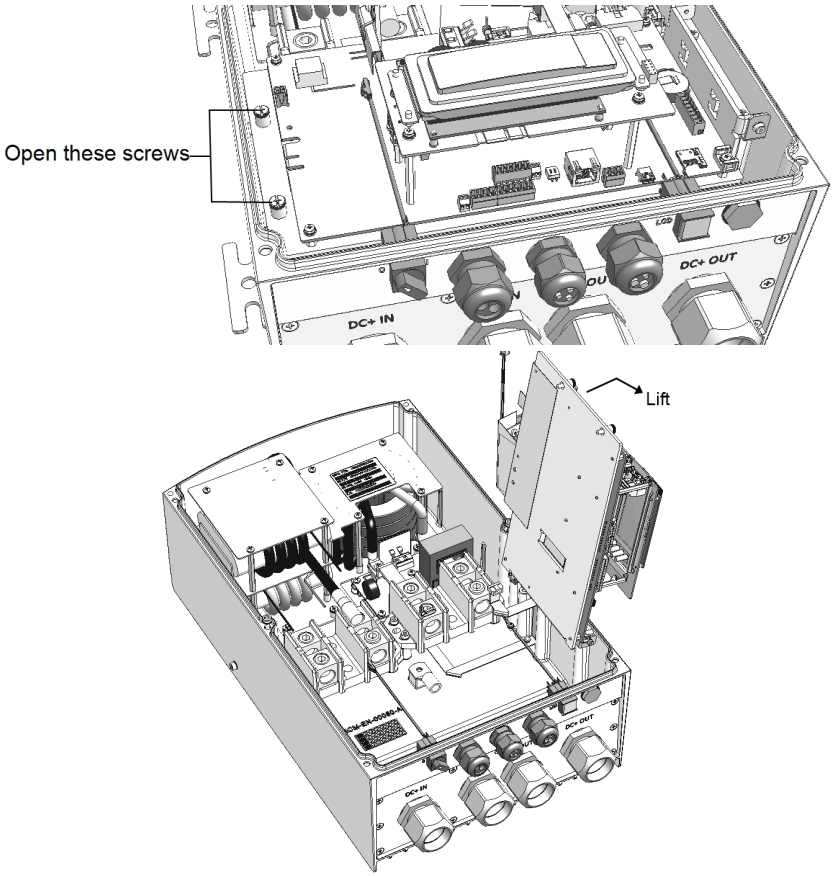


Figure 5: Accessing the SMI lower compartment

Chapter 2: Installing the SMI

CAUTION!

Do not rest the connectors at the bottom of the SMI on the ground, as it may damage them. To rest the SMI on the ground, lay it on its back, front or side.

Identifying the SMI

Refer to the sticker on the SMI that specifies its **Serial Number** and its **Electrical Ratings**. Provide the serial number when contacting SolarEdge support. The serial number is also required when opening a new site in the SolarEdge monitoring portal.

Installation Workflow

1. *Mounting the SMI* on page 11
2. *Accessing the Internal Compartments* on page 10
3. *Connecting PV Strings to the SMI* on page 15
4. *Connecting to a DC Power Supply* on page 19
5. *Step 2: Pairing Power Optimizers to the SMI* on page 23
6. *Connecting the SMI to an Inverter* on page 27
7. *Setting Up Communication* on page 42

Mounting the SMI

This chapter describes how to mount the SMI. At this stage, power optimizers are already installed and connected in strings. For more information on power optimizer installation, refer to the IndOP™ power optimizers installation guide available on the SolarEdge website at http://www.solaredge.com/files/pdfs/products/power-optimizers/se_power_optimizers_installation_guide_indop.pdf.

The SMI can be mounted either vertically or horizontally. Each of these installation options is described below. The SMI is supplied with two brackets pre-assembled for vertical mounting. When choosing the horizontal mounting option, remove these brackets and use the four floor anchoring brackets supplied in the package.

▶ To Mount the SMI vertically:

1. Determine the SMI mounting location, on a wall or pole, as follows:
   - To allow proper heat dissipation, maintain 2'' / 5 cm minimum clearance areas between the SMI and other objects.
   - Make sure the mounting surface or structure can support the weight of the SMI.

2. Position the mounting bracket against the wall and mark the drilling hole locations. Ensure that the flat side of the bracket is at the bottom.

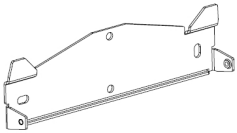


Figure 6: Wall mounting bracket

3. Use at least two bracket holes. Additional holes can be used to fix the bracket.Determine which and how many holes to use according to mounting surface type and material.
4. Drill the holes and mount the bracket. Verify that the bracket is firmly attached to the mounting surface.
5. Hang the SMI on the bracket: Align the two assembled brackets on the SMI enclosure with the two triangular protrusions of the mounting bracket, and lower the SMI until it rests on the bracket.

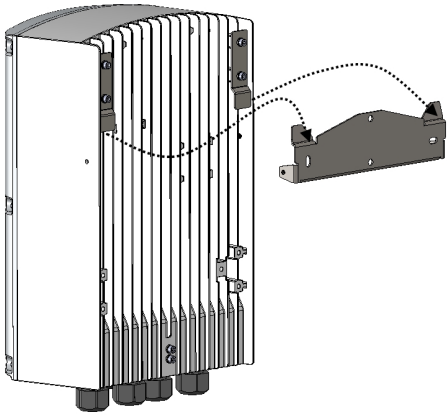


Figure 7: Hanging the SMI on the bracket

6. Insert the two supplied screws through the outer heat sink fin on both sides of the and into the bracket. Tighten the screws with a torque of 4.0 N*m / 2.9 lb.*ft.

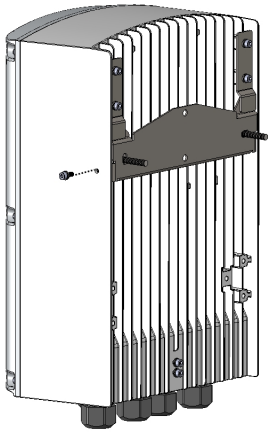


Figure 8: Inserting the bracket screw

To mount the SMI horizontally:

1. Determine the SMI mounting location, on a rail or on the floor, as follows:
   - To allow proper heat dissipation, maintain 2'' / 5 cm minimum clearance areas between the SMI and other objects.
   - Make sure the mounting surface or structure can support the weight of the SMI.
2. Remove the two vertical mounting brackets that are attached to the unit and used for vertical mounting.

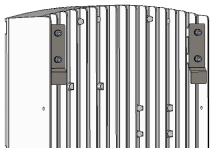


Figure 9: Vertical mounting brackets

3. Assemble the four horizontal mounting brackets (supplied in the package) to the SMI rear side. Make sure the floor anchoring holes are facing out.

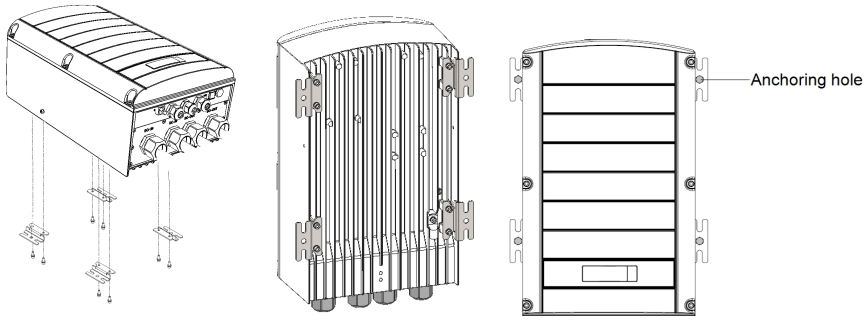


Figure 10: Horizontal mounting brackets

4. Mount the unit on the rail or structure: Use 5/16" screws or bolts (8.0 mm diameter) for anchoring to the surface.

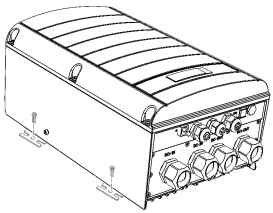


Figure 11: Horizontal anchoring screws

Functional earthling is required to enable the over-voltage protection. To earth the SMI, connect a grounding cable to the grounding location at the rear of the SMI. The grounding cable must be at least 1.5mm^2. You may use a cable of up to 50mm^2.

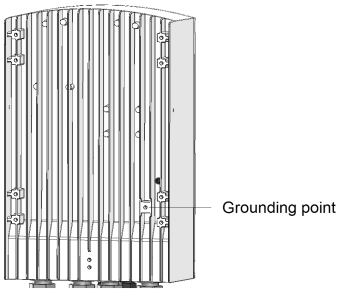


Figure 12: Grounding point

Connecting PV Strings to the SMI

The following procedure describes how to connect the DC cables from the power optimizer strings to the SMI. A typical installation has up to 18 strings connected to an SMI through a combiner box.

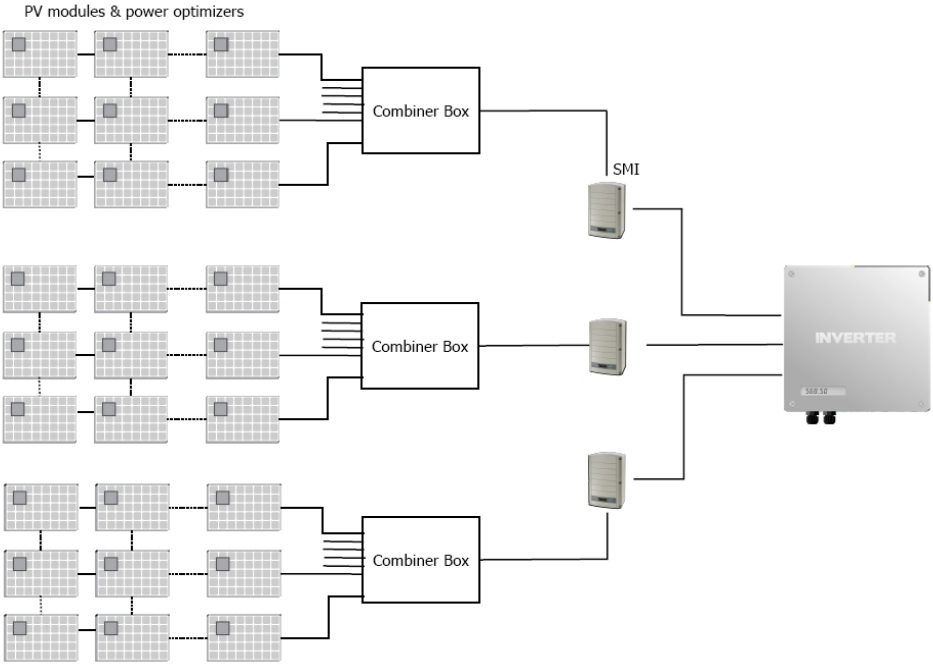


Figure 13: String connection

To determine how many strings can be connected to the SMI:

Verify that the cumulative short circuit current (I_{sc}) of all parallel-connected strings is below:

- The rated maximum input current of the inverter
- The rated maximum input current of the SMI

To connect DC strings to the SMI:

1. Open the lower compartment of the SMI as described in *Accessing the Internal Compartments* on page 10.

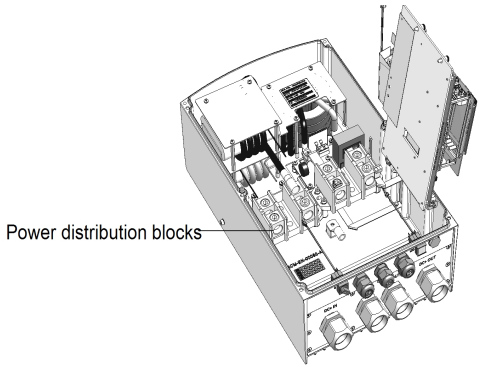


Figure 14: Connection area

2. Use an Allen key to loosen the 5/16" screws of the SMI DC power distribution blocks.
3. Remove the seal from the glands labeled DC+ IN/DC- IN.

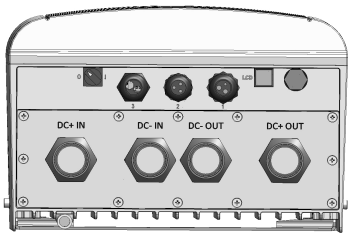


Figure 15: SMI - bottom view

4. If the cables from the combiner box are 18-25 mm in diameter, insert the wires through the opening.
   If the cables are less than 18 mm in diameter, replace the rubber seals in the gland with the rubber seals supplied in the SMI package, and insert the wires through the opening.

NOTE

Do not insert more than one wire through each gland: Insert the DC+ wire through the gland marked DC+ and the DC- through the gland marked DC-. Seal all the glands after installation.

5. Connect the cables to the DC+ and DC- input terminal blocks.
   If your local regulations require using cable lugs, use the lugs and screws supplied in the

package: Fasten the cable ring terminal to the lug (apply torque 17 N*m / 12.5 Lb*ft) and insert the lug into the input terminal blocks.

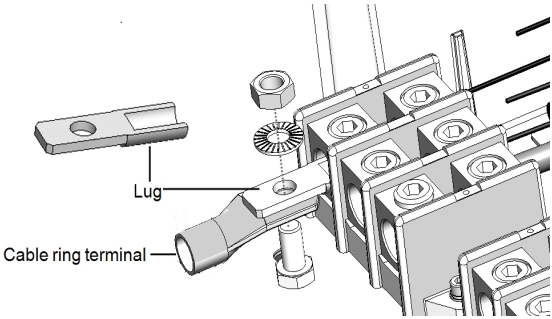


Figure 16: Using cable lugs

6. Fasten the Allen screws of the power distribution blocks. Apply a torque of 30 N*m / 22 lb.*ft.

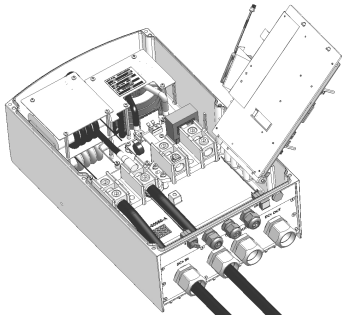


Figure 17: DC IN cables connected

7. Seal all glands.

If grounding of the DC wires is required, refer to the following figure that demonstrates proper and improper grounding locations (marked ✔ and ×).

NOTE

When connecting the SMI to a grounded array, the grounding must not be between the SMI and the power optimizers. All grounding should be at the inverter or between the SMI output and the inverter. The SMI allows both positive and negative grounding.

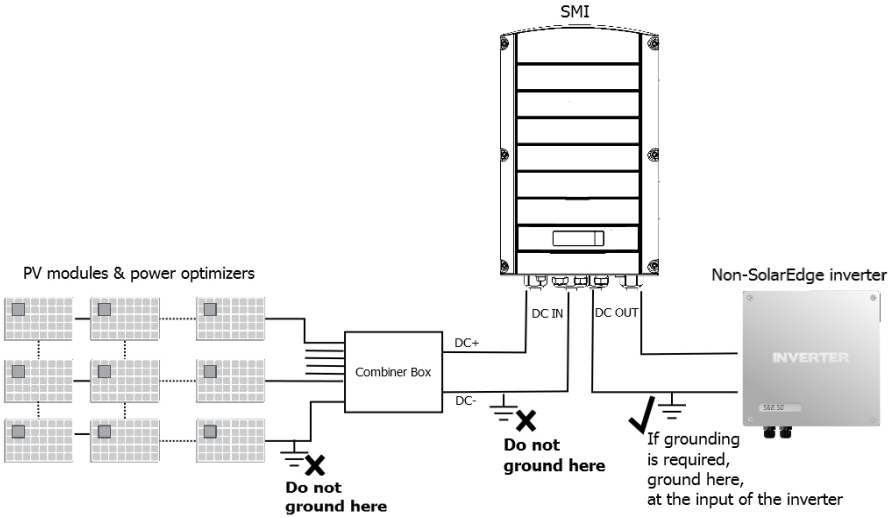


Figure 18: Example - Grounding locations

Connecting to a DC Power Supply

The SMI is powered from a separate DC power supply unit (PSU, not provided by SolarEdge). Use a PSU with 48V nominal voltage. The input of the SMI can be connected to voltages 30-55 VDC, and each SMI will consume 12W.

CAUTION!

The PSU must be limited or fused to 50A .

Up to 10 SMIs can connect to a single PSU.

Refer to the following table for selecting the PSU wiring and the DC wiring, depending on the number of SMIs connected to the same PSU:

No. of SMIs	AWG/mm^2	Cable length between PSU and the farthest SMI (m/ft)
10	14 / 2.08	570 / 1870
	18 / 0.82	220 / 722
	20 / 0.52	140 / 459
8	14 / 2.08	720 / 2362
	18 / 0.82	280 / 918
	20 / 0.52	180 / 590
6	14 / 2.08	960 / 3150
	18 / 0.82	380 / 1246
	20 / 0.52	240 / 787
4	14 / 2.08	1440 / 4724
	18 / 0.82	570 / 1870
	20 / 0.52	360 / 1181
2	14 / 2.08	2890 / 9481
	18 / 0.82	1140 / 3740
	20 / 0.52	720 / 2362

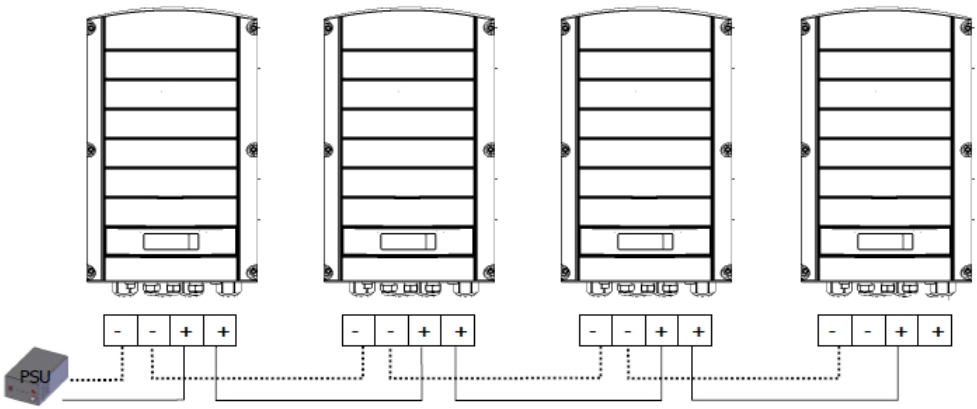


Figure 19: Power supply connection

To connect the power supply:

1. Strip 0.32''/ 8 mm of the power cable wire insulation.
2. Remove the seal from one of the openings in gland #3 and insert the wires through the opening. If the cable is not thick enough to seal the opening, use a free opening in gland #1 or #2.

Figure 20: The upper connection panel of the SMI

3. Loosen the screws of the pins on the leftmost and rightmost of the 4-pin connector (supplied in the SMI package). If connecting more than one SMI, loosen all four screws.
4. Connect the (-) wire(s) to the left side of the connector.
5. Connect the (+) wire(s) to the right side of the connector.

6. Push the connector into the 4-pin terminal block on the communication board.

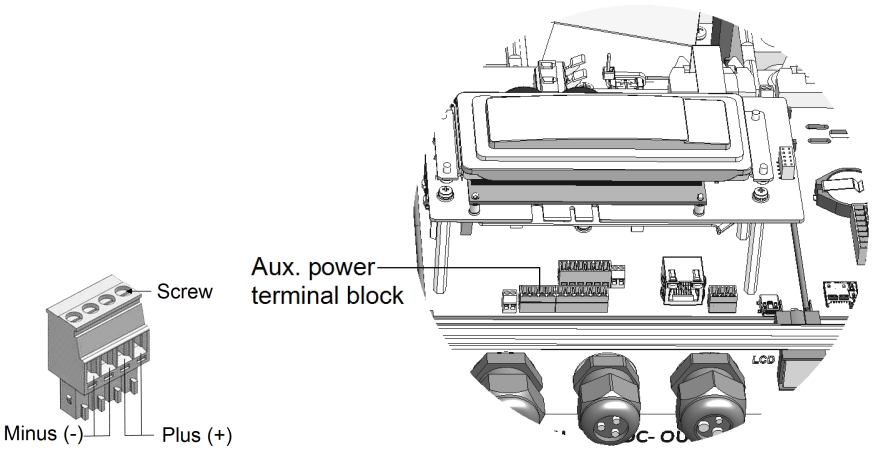


Figure 21: 4-pin connector and power supply (Aux. power) terminal block

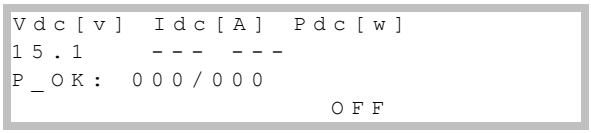
Chapter 3: Commissioning the Safety and Monitoring Interface

This chapter describes how to activate the system, pair the power optimizers to the SMI and verify the proper functioning of the system.

Activating the System

1. Make sure that theSMI is connected to the auxiliary power supply. Verify that its ON/OFF switch is OFF.

   A status screen similar to the following appears on the SMI LCD panel



2. Verify that the following information appears on the LCD panel:

   - **P_OK**: Appears only upon first telemetry reception from the power optimizers. Indicates connection to the power optimizers and that at least one power optimizer is sending monitoring data. If P_OK does not appear, check the power optimizer, string and DC input connections.
   - **000/000**: Appears only upon first telemetry reception from the power optimizers. Indicates the number of power optimizers that have been paired to this SMI. At this stage, the number should be 000, since no power optimizers have been paired.
   - **Vdc [V]**: The DC input voltage of the longest string connected to the SMI. There should be a safety voltage of 1V for each power optimizer in the string.

     NOTE

     A measurement error on the SMI LCD of ±3 V is acceptable.

   - **Idc [A]**: If the current-sensor option is set, displays the input current to the SMI . Otherwise displays ----.
   - **Pdc [w]**: If the power-sensor option is set, displays the input power to the SMI . Otherwise displays ----.
   - **OFF**: the SMI ON/OFF switch is in the OFF position. In MI, the display is always ON.

If the LCD panel shows 0V:

a. Verify that the PV modules are not shaded or otherwise obstructed.

b. Check for proper power optimizer, string and DC input connection.

c. Verify the correct polarity of the DC input connection.

Step 2: Pairing Power Optimizers to the SMI

Once all connections are made, all the power optimizers must be logically paired to their SMI. The power optimizers do not start producing power until they are paired with an SMI.

Perform this step before connecting the SMI to the inverter and when the modules are exposed to sunlight. If the string length is changed or a power optimizer is replaced, repeat the pairing process.

NOTE

Complete the pairing procedure before connecting the DC output of the SMI to the inverter.

Make sure that the output DC wires between the SMI and the inverter, and between the SMI and other SMIs are disconnected, otherwise the following error is displayed, and the pairing process halts:

```
Disconnect Output
```

1. Press and hold down the SMI LCD Light button for about **10 seconds**. The following message is displayed:

   ```
   Keep holding button
   for pairing, release
   to enter menu...
   Remaining:      3 sec
   ```

   Keep holding for 5 seconds until the following is displayed:

   ```
         Pairing

   Turn Switch To On
   ```

2. Turn the inverter ON/OFF switch to ON within 5 seconds. If you wait longer than 5 seconds the inverter exits the pairing mode. The following message is displayed indicating that the inverter is performing the pairing:

   ```
   Pairing

   Remaining [sec]:180
   ```

3. Wait for the completion of the pairing (remaining seconds is 0). If pairing fails, an error is displayed. In this case, repeat the pairing steps. If the problem persists, contact SolarEdge Support. When pairing succeeds, the following message is displayed:

   ```
   Pairing

   Pairing Completed
   ```

4. The system startup process begins:

   - Since the inverter is ON, the power optimizers start producing power and the inverter starts converting AC.

NOTE

When you turn ON the inverter ON/OFF switch, the DC cables carry a high voltage and the power optimizers no longer output a safe 1V output.

   - When the inverter starts converting power after the initial connection to the AC, the inverter enters Standby mode until its working voltage is reached. This mode is indicated by the flickering green inverter LED.
   - While the inverter is in Standby mode, it monitors the grid and verifies correct grid voltage and frequency. The following message is displayed:

```
Waking Up...
Remaining: 051 Sec
```

     The countdown indicates the seconds remaining until entering the Production mode. This time is in accordance with local regulations and is typically between three to five minutes.

   - When countdown is complete, the inverter enters Production mode and produces power. The steadily lit green inverter LED indicates this mode.

Step 3: Verifying Proper Operation

After pairing, a status screen similar to the following appears on the SMI LCD panel:

```
Vdc[v]  Idc[A]  Pdc[w]
430.1   26.1    11234
P_OK:  080/080
                    ON
```

1. Verify the following:
   - The green SMILED is steadily lit.
   - The ON/OFF indicator on the LCD panel reads **ON**.
   - **P_OK: XXX/YYY**: There is a connection to the power optimizers and at least one power optimizer is sending monitoring data. Optimizers send telemetries in a frequency of up to 10 minutes. Initially after pairing, both XXX and YYY values show 000 and the values increase as paired power optimizers are reported.

NOTE

It may take up to 20 minutes for all power optimizers to transmit their telemetries and to be counted on the LCD screen.

- **Vdc [v]** : Specifies the DC input voltage, which should equal the sum of the output voltages of all modules (and should be within the operating range of the SMI).

2. Take note of the serial # on the SMI label using the detachable 2D barcode sticker on each device. This information is used in the SolarEdge monitoring portal to identify this SMI and is needed to open a new site in the monitoring portal.

Step 4: Reporting and Monitoring Installation Data

NOTE

This step requires connecting one of the communication options. Refer to *Setting Up Communication* on page 42.

The SolarEdge Monitoring System

The SolarEdge monitoring portal enables accessing SolarEdge site information, including up-to-date information viewed in a physical or logical view.The monitoring portal is described in detail in the *SolarEdge Monitoring Portal User Guide*, available on the SolarEdge website at http://www.solaredge.com/files/pdfs/solaredge-monitoring-portal-user-guide.pdf.The SolarEdge monitoring portal can display logical and physical layouts of the installed system, as follows:

- **Logical Layout**: Shows a schematic logical layout of the components in the system, such as: inverters, strings and modules, as well as their electrical connectivity. This view enables you to see which modules are connected in each string, which strings are connected to each inverter, and so on.
- **Physical Layout**: Shows a schematic physical layout of the components in the system, such as: inverters, strings and modules, as well as their electrical connectivity. This view enables a bird's eye view of the actual location of a system component.

Using the portal, you can:

- View the latest performance of specific components.
- Find under-performing components, such as modules, by comparing their performance to that of other components of the same type.
- Pinpoint the location of alerted components using the physical layout.
- See how components are connected to each other.
- Pair power optimizers remotely.

To display a logical layout, insert the serial numbers and other general information and SMI in the new site created in the application. When the communication between the SMI and the monitoring server is established, the logical layout will be displayed.

To display a physical layout, you need to map the locations of the installed power optimizers. To generate a physical mapping, use a mapping template, which should be filled out using the detachable stickers (see *Providing Installation Information*, below).

The logical and physical mapping can be used for debugging a problem using the SolarEdge monitoring portal.

If you do not report the physical and logical mapping of the installed power optimizers to SolarEdge, the SolarEdge monitoring portal will show the logical layout indicating which power optimizers are connected to which SMI, but will not show strings or the physical location of power optimizers.

The SMI may be connected to the SolarEdge monitoring portal via LAN or via an external modem connected to the SMI's RS232 connector. Alternatively, you can connect the SMI to another SMI that is already connected to the server, in a master-slave configuration. Refer to *Setting Up Communication* on page 42 .

Providing Installation Information

Paper Template

Fill out the Physical Layout Template using the detachable 2D barcode stickers on each power optimizer. Once the form is completed, scan it and upload the scanned file to the SolarEdge monitoring portal during site registration. For an example paper template, refer to http://www.solaredge.com/files/pdfs/physical-layout-template.pdf.

Creating a Site in the SolarEdge Monitoring Portal

Create the site in the monitoring portal using the registration form available at t http://www.solaredge.com/groups/site-registration. Fill out all required information in the form, which includes information about your installation, as well as details about its logical and physical mapping.

Chapter 4: Connecting the SMI to an Inverter

Up to 10 SMIs may be connected to each inverter (MPP tracker). The DC out cables connect the SMI to the inverter. Connection to the inverter is the last stage of installation.

Connecting the DC Out Cables to the SMI

1. Turn OFF the SMI ON/OFF switch and the DC breaker between the SMI and modules (if applicable).

   The SMI enters the SafeDC™ mode and displays the following message. This message is displayed until the DC voltage is safe (50V).

   If the SMI was operating properly (power was produced by the power optimizers), the following message is displayed.

   ```
   DC VOLTAGE NOT SAFE
    DO NOT DISCONNECT
      VDC:     72.0
   ```

   WARNING!

   Do not open the cover or touch the DC power connections until the voltage is safe or until at least five minutes have passed. Doing so may cause injury or loss of life, damage to the device and/or danger of fire.

2. Turn OFF the PSU.
3. Switch the AC to the inverter OFF (as described in its manual). If applicable, turn the inverter DC Safety Switch to OFF.
4. Open the lower compartment of the SMI as described in *Accessing the Internal Compartments* on page 10.
5. Use a 5/16" Allen key to loosen the screws of the SMI DC power distribution blocks.
6. Remove the seals from the glands labeled DC+OUT/DC-OUT.
7. If the cables that will connect to the inverter are 18-25 mm in diameter, insert the wires through the opening.
   If the cables are less than 18 mm in diameter, replace the rubber seals in the gland with the rubber seals supplied in the SMI package, and insert the wires through the opening.
8. Connect the cables to the DC+ and DC- output connectors as indicated.

   NOTE

   Do not insert more than one wire through each gland: Insert the DC+ wire through the gland marked DC+ and the DC- through the gland marked DC-. Seal all the glands after installation.

9. Fasten the Allen screws of the power distribution blocks. Apply torque of 30 N*m/ 22 ft*lb.

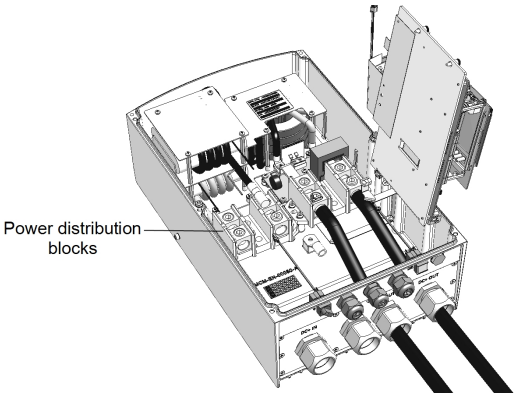


Figure 22: DC out cables connected

Connecting the Inverter to the SMI

1. Verity that the pairing procedure is complete, as described in *Step 2: Pairing Power Optimizers to the SMI* on page 23.
2. Connect the SMI DC+ and DC- output wires to the input of the inverter.

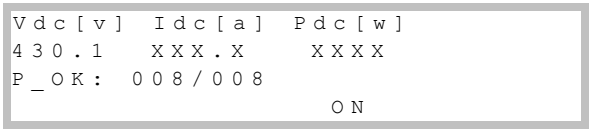
CAUTION!

Complete the pairing procedure *before* connecting the DC output of the SMI to the inverter. Do not perform pairing when the DC output of the SMI is connected to the inverter.

3. Switch the AC to the inverter ON (as described in its manual). If applicable, turn the inverter AC/DC Safety Switch to ON.
4. Turn ON the SMI ON/OFF switch and the PSU.
5. Wait for the inverter to start producing power.

Verifying Proper Operation

A status screen similar to the following appears on the SMI LCD panel:



1. Verify the following:
   - The green inverter LED is steadily lit.
   - The ON/OFF indicator on the LCD panel reads ON.
   - **P_OK**: XXX/YYY: There is a connection to the power optimizers and at least one power optimizer is sending monitoring data.
   - **Vdc [v]**: Specifies the DC input voltage, which should be within the DC voltage operating range of the SMI.
   - **Idc [A]**: The DC input current
   - **Pdc [w]**: Specifies the expected DC output power.
2. Take note of the serial # on the SMI label. This information is used in the SolarEdge monitoring portal to identify this SMI and is needed when opening a new site in the monitoring portal.

Chapter 5: User Interface

LCD User Buttons

Four buttons are located inside the SMI above the LCD panel and are used for controlling the LCD menus, as shown below:

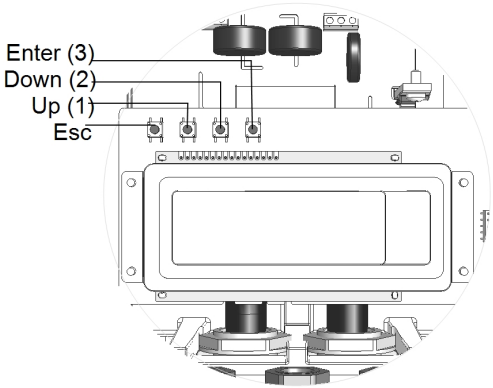


Figure 23: LCD Internal menu buttons

- **Esc**: Moves the cursor to the beginning of the currently displayed parameter; goes to the previous menu, and cancels a value change with a long press (until **Aborted** is displayed).
- **Up (1), Down (2)**: Moves the cursor from one menu option to another, moves among the characters of a displayed parameter, and toggles between possible characters when setting a value.
- **Enter (3)**: Selects a menu option and accepts a value change with a long press (until **Applied** is displayed).

Use the three rightmost buttons for entering **123** when entering the password.

The LCD panel and buttons may be used during the following:

- **Setup mode**: Upon SMI installation, the field technician may perform basic configuration, as described in *SMI Configuration – Setup Mode* on page 31.
- **Operational mode**: The LCD panel allows checking for proper system operation. Refer to *Status Screens - Operational Mode* on page 38 for a description of this option. Use the LCD light button to toggle through the informative displays.
- **Error messages**: In the event of a problem, an error message may be displayed on the LCD panel. For more information, refer to *Errors and Troubleshooting* on page 53.

SMI Configuration – Setup Mode

You can configure the SMI using one of the following:

- The internal LCD user buttons. When using this option, the SMI cover is removed.
- The external LCD light button. When using this option, removing the SMI cover is not required. This option of configuration includes a less detailed configuration menu.

Configuring the SMI Using the Internal LCD User Buttons

After SMI installation, a field technician may perform basic system configuration. Configuration is done when the SMI is in Setup mode.

To enter Setup mode:

1. Turn OFF the DC from the inverter, either by turning OFF the DC breaker (if applicable) or by turning OFF the inverter as described in its manual.
2. Turn the SMI ON/OFF switch to OFF. Wait until the voltage is safe (<50V).

WARNING!

Do not touch the DC power connections until the DC voltage is at a safe level. Doing so may cause injury or loss of life, damage to the device and/or danger of fire.

3. Remove the SMI cover.as described in *The SMI Internal Interfaces* on page 9.
4. Press the Enter button for at least 5 seconds. The following message is displayed:

```
Please enter
Password
  ********
```

5. Use the three rightmost internal LCD user buttons to type in the following password: **12312312**. The following message is displayed:

```
Country <Italy>
Language <Eng>
Communication
Display
Maintenance
Information
```

The SMI is now in Setup mode and all its LEDs are lit. The SMI automatically exits Setup mode if no buttons are pressed for more than 2 minutes.

The following shows a hierarchical tree of the menu options, which are described in *Configuration Menu Options* on page 35. Actual menus may vary from shown depending on the firmware version of the SMI.

Main menu:

```
Country <Italy>
Language <Eng>
Communication
Display
Maintenance
Information
```

Language:

```
English
German
Spanish
French
Italian
```

Communication[1]

```
Server<LAN>
LAN Conf
RS485-1 Conf<S>
RS485-2 Conf<S>
ZigBee Conf<S>
Wi-Fi Conf<N/A>
RS232 Conf
Slave Detect
```

Display:

```
Temperature <C>
LCD On Time <30>
TLM On Time <15>
```

Maintenance:

```
Date and Time
Reset Counters
Factory Reset
SW Upgrade SD-Card
```

Information:

```
Versions
Error Log
Warning log
```

[1] If ZigBee is connected, the Wi-Fi Conf menu is not displayed. If ZigBee is not connected, ZigBee Conf and Wi-Fi Conf are both displayed with <N/A>.

Configuring the SMI Using the LCD Light Button

Use the LCD light button for communication setup and for displaying the Error log and Warning Log without having to open the SMI cover. There are fewer menus available when using this configuration option; however, the functionality of these menus is the same as when using the internal LCD user buttons.

1. Turn the SMI ON/OFF switch to OFF.
2. Press and hold down the LCD light button until the following message is displayed:

```
Keep holding button
for pairing, release
to enter menu...
Remaining       3sec
```

Releasing the button displays the following menu:

```
Optimizer pairing
Language <eng>
Communication
Maintenance
Information
Exit
```

3. Short-press (one second) to scroll down to the next menu option, and long-press (three seconds) to select the item. You can use the **Exit** option in these menus to move up one menu level or to exit the Setup mode from the main menu.

The following shows a hierarchical tree of the menu options that appear when using the LCD light button:

Main menu:

```
Optimizer pairing
Language <eng>
Communication
Maintenance
Information
Exit
```

Language:

```
English
German
Spanish
French
Italian
Exit
```

Communication[1]:

```
Server<LAN>
LAN Conf
RS485-1 Conf<S>
RS485-2 Conf<S>
ZigBee Conf<S>
Wi-Fi Conf<N/A>
RS232 Conf
Slave Detect
Exit
```

Information:

```
Error Log
Warning log
Exit
```

Maintenance:

```
Date and Time
Reset Counters
Factory Reset
SW Upgrade SD-Card
Exit
```

The options presented in these menus are described in the next section.

[1] If Wi-Fi is connected, the ZigBee Conf menu is not displayed, and vice versa.

Configuration Menu Options

This section describes how to use the LCD menus for configuring the SMI. Configuration is only available when the SMI ON/OFF switch is OFF. Use either the internal LCD user buttons or the external LCD light button to move between and select menu options.

Language

1. Select the **Language** option to set the language in which the LCD should display.
2. Confirm your language selection in the confirmation screen: Toggle to **YES** and press **Enter**.

Communication

1. Select the **Communication** option to define and configure the communication option used by the SMI to communicate with the SolarEdge monitoring portal and the communication option used to communicate between multiple SMIs.
2. Select **Server** to set which communication method is used to communicate between the SMI and the SolarEdge monitoring portal. Refer to *Setting Up Communication* on page 42 for a full description of these communication options.

NOTE

This menu shows only the communication options installed in the SMI.

The following shows a hierarchical tree of the menu options in the **Communication** menu. For detailed information about all the configuration options, refer to the *Communication Options Application Note*, available on the SolarEdge website at

http://www.solaredge.com/files/pdfs/solaredge-communication_options_application_note_v2_250_and_above.pdf.

Communication[1]:

```
Server<LAN>
LAN Conf
RS485-1 Conf<S>
RS485-2 Conf<S>
ZigBee Conf<S>
Wi-Fi Conf<N/A>
RS232 Conf
Slave Detect
```

[1] If ZigBee is connected, the Wi-Fi Conf menu is not displayed. If ZigBee is not connected, ZigBee Conf and Wi-Fi Conf are both displayed with <N/A> and their menus are not accessible.

Server:

```
LAN
RS485
Zigbee
Wi-Fi
RS232
None
```

LAN Conf:

```
IP Config
Set DHCP <en>
Set IP
Set Mask
Set Gateway
Set DNS
Set Server Addr
Set Server Port
```

RS485-X Conf:

```
Device Type<SE>
Protocol<M>
Device ID<1>
Slave Detect
```

ZigBee Conf. (enabled only if the ZigBee internal module is connected):

```
Device Type<SE>
Protocol<P2P>
Device ID<1>
PAN ID
Scan Channel
Load ZB Defaults
```

Wi-Fi Conf (enabled only if the internal module is connected):

```
Scan Networks
Set key
Load Defaults
```

RS232 Conf:

```
Device Type<SE>
Protocol<GSM>
Set APN
Set Modem Type
Set User Name
Set Password
```

Display

Select **Display** to set the following three options:

```
Temperature <C>
LCD On Time <30>
TLM On Time <15>
```

- **Temperature**: Select Celsius or Fahrenheit units.
- **LCD On Time <30>**: The number of seconds that the LCD backlight is ON after pressing the LCD light button. Set a value within the range of 10-120 seconds.
- **TLM On Time <15>**: The number of minutes that the LCD backlight is ON while viewing the Telemetry window. Set a value within the range of 1-120 minutes.

Maintenance

Select **Maintenance** to set the following options:

```
Date and Time
Reset Counters
Factory Reset
SW Upgrade SD-Card
```

- **Date and Time**: Set the internal real-time clock. If connected to the SolarEdge monitoring portal, the date and time are set automatically and only time zone should be set.
- **Reset Counters**: Resets the accumulated energy counters that are sent to the SolarEdge monitoring portal
- **Factory Reset**: Performs a general reset to the SMI default settings.
- **SW Upgrade SD Card**: Perform a software upgrade using an SD card.

Information

Select **Information** to display the following options:

```
Versions
Error Log
Warning log
```

- **Versions**: Displays SMI firmware versions:
  - **ID**: The SMI ID.
  - **DSP 1**: The DSP digital control board firmware version
  - **CPU**: The communication board firmware version

NOTE

Please have these numbers ready when you contact SolarEdge Support.

- **Error Log**: Displays the last five errors.
- **Warning Log:** Displays the last five warnings.

Status Screens - Operational Mode

Pressing the external LCD light button turns on the LCD backlight. Additional presses display the following screens one after the other.

Initial SMI Status

```
Vdc[V]  Idc[A]  Pdc[W]14.1
xxx.x     xxxx
P_OK:  XXX/YYY  <S_OK>
OFF
```

- **Vdc [V]**: The DC output voltage
- **Idc [A]**: The DC output current
- **Pdc [W]**: The DC output power
- **P_OK: XXX/YYY**: There is a connection to the power optimizers and at least one power optimizer is sending monitoring data. XXX is the number of power optimizers for which telemetries have been received in the last two hours. YYY is the number of paired power optimizers identified during the most recent pairing process. If XXX and YYY are not equal, there may be a problem in one or more power optimizers.
- **S_OK**: The connection to the SolarEdge monitoring portal is successful .
- **ON/OFF**: Indicates the position of the SMI ON/OFF switch.

Telemetry Status

This window displays the last power optimizer telemetry received. The display changes as each power optimizer sends its telemetry.

In order to verify proper installation, the installer may view the Telemetry window for some time in order to observe the power optimizers' report process.

```
Module:   000C1ED9-03
Energy[Wh]:0
Vdc_O[V]:40.5
Vdc_I[V]:29.5
```

- **Module#**: Power optimizer serial number
- **Energy**: power optimizer energy
- **Vdc_O**: Power optimizer output voltage
- **Vdc_I**: Power optimizer input voltage (module voltage)

ID Status

This window displays the SMI software version.

```
ID:  ########  ##7F10373E  03
DSP1:1.0210
CPU:0002.0111
```

- **ID**: The SMI ID.
- **DSP 1**: The DSP digital control board firmware version
- **CPU**: The communication board firmware version

Server Communication Status

```
Server:LAN          <S_OK>
Status:              <OK>
xxxxxxxx
<ERROR MESSAGE>
```

- **Server**: The method of connection to the SolarEdge monitoring portal.
- **S_OK**: The connection to the SolarEdge monitoring portal is successful (should appear only if the SMI is connected to the server).
- **Status**: Displays OK if the SMI established successful connection and communication with the specified server port/SMI (LAN, RS485, Wi-Fi or ZigBee module).
- **xxxxxxxx**: Eight-bit Ethernet communication connection status: A string of 1s and 0s is displayed. 1 indicates OK, 0 indicates an error. For a list of the possible errors and how to troubleshoot them, refer to *Troubleshooting Communication - S_OK is Not Displayed* on page 53 .
- **Error message**, according to failure. Refer to *Errors and Troubleshooting* on page 53.

IP Status

This window describes the Ethernet configuration: IP, Mask, Gateway and MAC address (Media Access Control) of the SMI.

```
IP   192.168.2.119
MSK  255.255.255.0
GW   192.168.2.1
MAC  0-27-02-00-39-36
```

ZigBee Status

This window describes the ZigBee configuration:

```
PAN:XXXXX
Ch:XX/XXXX    RSSI:<L>
ID:XXXXXXXX
MID:XXXX  XX
```

- **RSSI**: The receive signal strength indication of the closest ZigBee in the system. L = low, M = medium, H = high and
  (-) = no signal.
- **PAN ID**: The ZigBee transceiver PAN ID
- **Ch.**: The ZigBee transceiver channel
- **ID**: The ZigBee transceiver ID
- **MID**: The Master ID of the coordinator (master) ZigBee module. This field is shown only in devices with router (slave) ZigBee modules. This field appears after a successful ZigBee association. If a ZigBee module is not connected, a **No ZigBee** message is displayed instead of the **MID** field.

Wi-Fi Status

This window describes the Wi-Fi configuration:

```
IP:  192.168.2.119
GW:  192.168.2.1
SSID:  xxxxxxxx
RSSI:  <L/M/H/->
```

- **IP**: The DHCP provided address
- **GW**: The gateway IP address
- **SSID**: Service Set Identifier - the name of a wireless local area network (WLAN). All wireless devices on a WLAN must employ the same SSID in order to communicate with each other.
- **RSSI**: The receive signal strength indication of the closest Wi-Fi in the SolarEdge system. L = low, M = medium, H = high
  and - = no signal.

Communication Ports Status

```
             D e v   P r o t   # #
R S 4 8 5 - 1 < S E > < S  >  < - - >
R S 4 8 5 - 2 < S E > < M  >  < - - >
Z i g B e e  < S E > < M P S > < - - >
```

- **##:** The total number of slaves detected on the specific port
- **Dev**: The type of device that was configured to a specific port (based on the port's functionality), as follows:
  - **SE**: SolarEdge device (default)
  - **DM**: Revenue meter
  - **LGR**: Non-SolarEdge logger
- **PROT**: The protocol type to which the port is set:
  - For a SolarEdge device:
    - **S**: SolarEdge slave
    - **M**: SolarEdge master
    - **P2P**: ZigBee point-to-point
    - **MPM**: ZigBee multipoint master (for the SolarEdge ZigBee home gateway)
    - **MPS**: ZigBee multipoint slave (for a ZigBee router module)
  - For a revenue meter reader, refer to the *application note - Connecting an Electricity Meter to SolarEdge Devices* at http://www.solaredge.com/files/pdfs/connecting-revenue-grade-meter-to-solaredge-devices.pdf.
  - **SS**: SunSpec - for a non-SolarEdge logger

Available from communication board (CPU) firmware version 2.7xx/3.7xx and later.

Chapter 6: Setting Up Communication

Power optimizers send information to the SMI via the DC power lines (the PV output circuit). The information is sent from the SMI to the SolarEdge monitoring portal through the Internet. In order to send the data from the SMI, a communication connection must be set up, as described in this chapter. Communication setup is not required for power harvesting, however is needed for using the SolarEdge monitoring portal.

This chapter also describes setting up communication between multiple SMIs for a master/slave configuration.

CAUTION!

When connecting the communication cables, make sure that the ON/OFF switch at the bottom of the SMI is turned OFF, and the power is turned OFF.
When configuring the communication parameters, make sure that the ON/OFF switch is OFF, and the power is turned ON.

Communication Types

- **Ethernet**: used for a LAN connection
- **RS485**: the most commonly used communication type, used for the connection of multiple SolarEdge devices on the same bus in a master-slave configuration. RS485 type can also be used as an interface to external non-SolarEdge devices, such as revenue meters and data loggers. The SMI has two RS485 physical ports with the following capabilities:
  - RS485-1: Enables the connection of multiple SMI units through the same bus, such that connecting only one device to the Internet is sufficient to provide communication services for all the SMI units on the bus.
  - RS485-2: Enables connection of non-SolarEdge devices, such as inverters and revenue metering devices.
- **Wi-Fi**: Optional wireless connection (purchased separately).
- **ZigBee**: optional wireless communication (purchased separately).

Always connect the communication options when the inverter is OFF.

Communication Connectors

Two communication glands are used for connection of the various communication options. Each gland has three openings. The table below describes the functionality of each opening. Unused openings should remain sealed.

Gland#	Opening	Functionality	Cable Size (diameter)
1 (PG16)	One small	External antenna cable	2-4 mm
	Two large	Ethernet connection (CAT5/6), ZigBee, Wi-Fi or RS232	4.5-7 mm
2 (PG13.5)	All three	RS485	2.5-5 mm

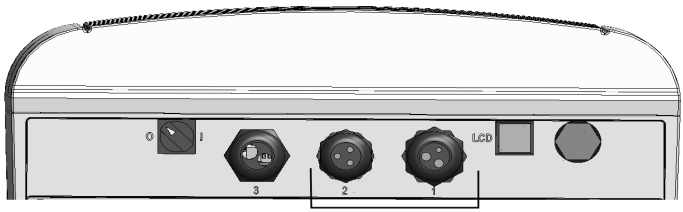


Figure 24: Communication Glands

The communication board has a standard RJ45 terminal block for Ethernet connection, a 9-pin terminal block for RS232 or RS485 connection, and a Mini USB connector, as shown below:

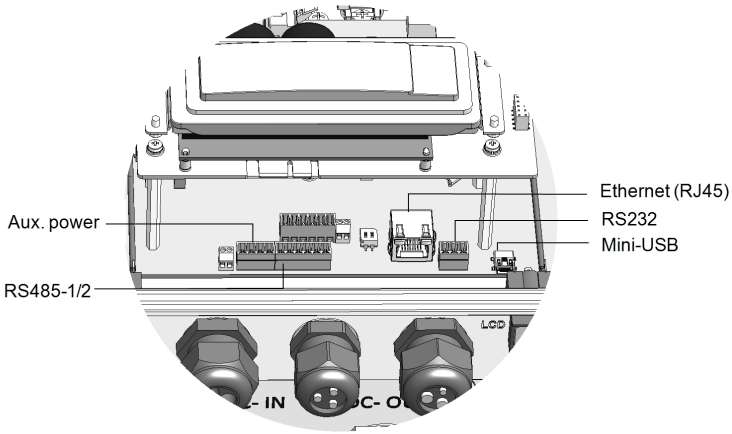


Figure 25: Internal connectors

Creating an Ethernet (LAN) Connection

This communication option enables using an Ethernet connection to connect the SMI to the monitoring portal through a LAN.

Ethernet cable specifications:

- Cable type – CAT5/CAT6
- Maximum distance between the SMI and the router – 100 m/ 330 ft.

NOTE

If using a cable longer than 10 m/33 ft in areas where there is a risk of induced voltage surges by lightning, it is recommend to use external surge protection devices. For details refer to: http://www.solaredge.com/files/pdfs/lightning_surge_protection.pdf. If grounded metal conduit are used for routing the communication wires, there is no need for a lightning protection device.

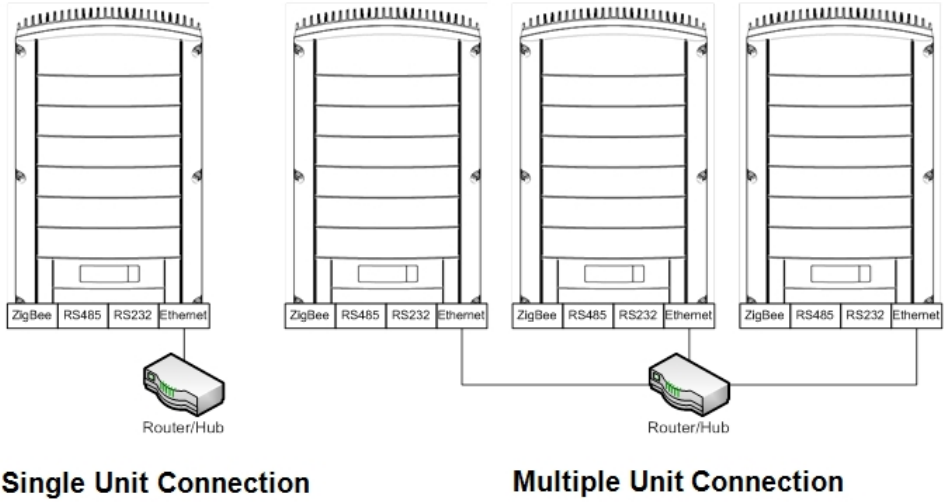


Figure 26: Example of Ethernet connection

To connect the Ethernet cable:

1. Remove the SMI cover as described in *The SMI Internal Interfaces* on page 9.
2. Open the communication gland #1.

CAUTION!

The gland includes a rubber waterproof fitting, which should be used to ensure proper sealing.

3. Remove the plastic seal from the large opening that has a cut in the rubber fitting and insert an Ethernet CAT5/6 cable through the opening.
4. Remove the rubber fitting from the gland and insert the CAT5/6 cable through the gland and through the gland opening in the inverter.
5. Push the cable into the cut opening of the rubber fitting.

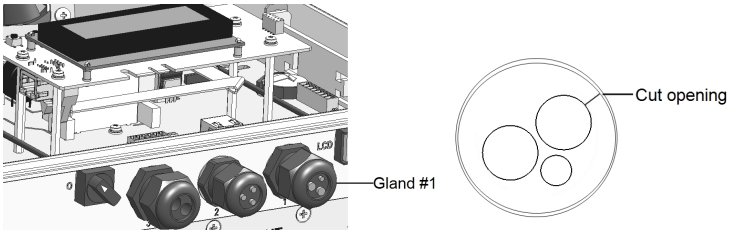


Figure 27: Cable glands and rubber fitting

CAT5/6 standard cables have eight wires (four twisted pairs), as shown in the diagram below. Wire colors may differ from one cable to another. You can use either wiring standard, as long as both sides of the cable have the same pin-out and color-coding.

RJ45 Pin #	Wire Color[1]		10Base-T Signal 100Base-TX Signal
	T568B	T568A	
1	White/Orange	White/Green	Transmit+
2	Orange	Green	Transmit-
3	White/Green	White/Orange	Receive+
4	Blue	Blue	Reserved
5	White/Blue	White/Blue	Reserved
6	Green	Orange	Received-
7	White/Brown	White/Brown	Reserved
8	Brown	Brown	Reserved

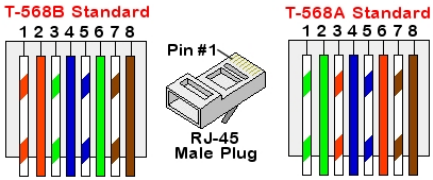


Figure 28: Standard cable wiring

[1] The SMI connection does not support RX/TX polarity change. Supporting crossover Ethernet cables depends on the switch capabilities.

6. Use a pre-crimped cable to connect via gland #1 to the RJ45 plug on the inverter's communication board or, if using a spool of cable, connect as follows :
   a. Insert the cable through gland #1.
   b. Remove the cable's external insulation using a crimping tool or cable cutter and expose eight wires.
   c. Insert the eight wires into an RJ45 connector, as described in *Figure 28*
   d. Use a crimping tool to crimp the connector.
   e. Connect the Ethernet connector to the RJ45 port on the digital board.

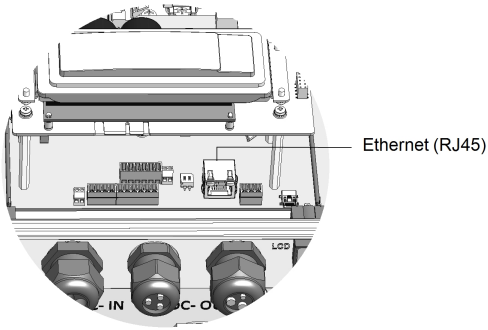


Figure 29: The RJ45 Ethernet connection

7. For the switch/router side, use a pre-crimped cable or use a crimper to prepare an RJ45 communication connector: Insert the eight wires into the RJ45 connector in the same order as in *Figure 28*.
8. Connect the cable RJ45 connector to the RJ45 port of the Ethernet switch or router.
   You can connect more than one inverter to the same switch/router or to different switches/routers, as needed. Each inverter sends its monitored data independently to the SolarEdge monitoring portal.

9. The SMI is configured by default to LAN. If reconfiguration is required:
   a. Make sure the ON/OFF switch is OFF.
   b. Turn ON the PSU.

WARNING!

ELECTRICAL SHOCK HAZARD. Do not touch uninsulated wires when the SMIcover is removed.

   c. Use the internal user buttons to configure the connection, as described in *Communication* on page 35

NOTE

If your network has a firewall, you may need to configure it to enable the connection to the following address:

- Destination Address: prod.solaredge.com
- TCP Port: 22222 (for incoming and outgoing data)

10. Verify the connection, as described in *Verifying the Connection* on page 51.

Creating an RS485 Bus Connection

The SMI can connect to other SolarEdge devices, such as other SMIs, or SolarEdge control and communication gateways. The SMI can also connect to non-SolarEdge devices, such as revenue grade meters or non-SolarEdge inverters and read their data for display in the SolarEdge monitoring portal.

The RS485 option enables creating a bus of connected SMIs, consisting of one master SMI and up to 31 slave SMIs. Using this option, the SMIs are connected to each other in a bus (chain), via their RS485 connectors.

RS485 wiring specifications:

- Cable type: Min. 3-wire shielded twisted pair (a 4-wire cable may be used)
- Wire cross-section area: 0.2- 1 mm²/ 24-18 AWG (a CAT5 cable may be used)
- Maximum nodes: 32
- Maximum distance between first and last devices: 1 km /3300 ft.

NOTE

If using a cable longer than 10 m/33 ft in areas where there is a risk of induced voltage surges by lightning, it is recommend to use external surge protection devices. For details refer to: http://www.solaredge.com/files/pdfs/lightning_surge_protection.pdf. If grounded metal conduit are used for routing the communication wires, there is no need for a lightning protection device.

This section describes how to connect the RS485 bus and how to configure the bus.

The following menus can be used for RS485 port configuration.

RS485-1/2 Conf:

```
Device Type<SE>
Protocol<M>
Device ID<1>
Slave Detect<0>
```

Device Type:

```
SolarEdge<M/S>
Non-SE Logger<S>
Revenue Meter <M>
None
```

Protocol:

```
Master
Slave
SunSpec
```

Set Device ID:

```
---
```

- **Device Type** is used to select the specific port configuration. The following devices are supported:
  - **SolarEdge** (default for RS485-1): Used when connecting to SolarEdge devices, such as: other SMIs, gateways, or inverters. By default, all SolarEdge devices are pre-configured as slaves on the RS485-1 port.
  - **Revenue Meter**: Used when connecting to an external revenue grade meter, in order to read the meter data and send it to the monitoring portal. For a list of supported meters, refer to http://www.solaredge.com/files/pdfs/connecting-revenue-grade-meter-to-solaredge-devices.pdf.
  - **Non-SE Logger**: Used when connecting to an external non-SolarEdge logger. The logger can read SolarEdge inverter data for monitoring purposes.
  - **None** (default for RS485-2)

NOTE

For other supported protocols, refer to http://www.solaredge.com/articles/se-supported-devices.

- **Slave Detect**: Is used to initiate automatic detection of the slaves connected to the master SMI. The number next to the option is the number of slaves that have been detected.

To connect the RS485 communication bus:

Use a four-wire twisted-pair cable for the connection.

1. Remove the SMI cover, as described in *Opening and Closing the SMI Cover* on page 9.
2. Remove the seal from one of the openings in communication gland #2 and insert the wire through the opening.
3. Loosen the screws of pins B, A and G on the left (RS485-1) of the of the 6-pin RS485 connector supplied with the SMI package.

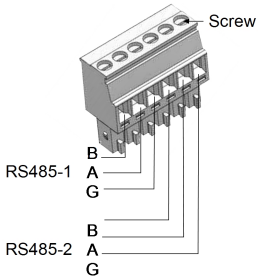


Figure 30: RS485 connector

4. Insert the wire ends into the G, A and B pins shown above. You can use any color wire for each of the A, B and G connections, as long as the same color wire is used for all A pins, the same color for all B pins and the same color for all G pins.
5. Connect all B, A and G pins in all SMIs. The following figure shows this connection schema:

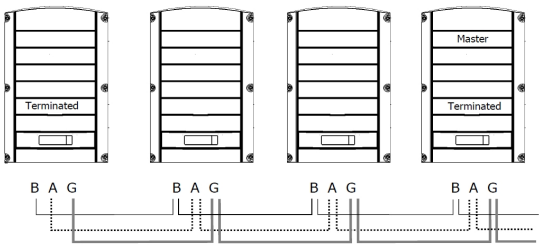


Figure 31: Example of multiple SMI units in an RS485 bus connection

NOTE

Do not cross-connect B, A and G wires. Make sure you are using the same RS485 port (1/2) in all devices.

6. Tighten the terminal block screws.
7. Push the RS485 terminal block firmly all the way into the communication board.
8. Terminate the first and last SMIs in the chain by switching a termination DIP switch, located on the communication board and marked SW200, to ON (move the right switch down).

NOTE

Only the first and last SMI in the chain should be terminated. The other SMIs in the chain should have the termination switch OFF.

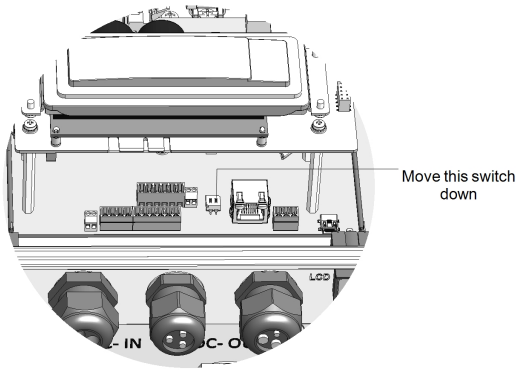


Figure 32: SW200 DIP switch

To connect to the Server:

1. Designate the first or the last SMI to be the connection point between the RS485 bus and the SolarEdge monitoring server. This SMI will serve as the master device.
2. Connect the master to the SolarEdge monitoring portal via one of the communication options (Ethernet, GSM or ZigBee).

To configure the RS485 communication bus:

By default, all SolarEdge devices are pre-configured as slaves on the RS485-1 port. Slaves can be further configured using the **RS485-1 Conf** option in the Communication menu.

1. Enter Setup mode, as described in *SMI Configuration – Setup Mode* on page 31
2. Select **Communication → Server → RS485-1/2 Conf** (1 or 2 depending on the specific physical port connection) to communicate with different external devices (SolarEdge inverters, revenue meters, non-SolarEdge loggers or non-SolarEdge inverters).

3. To configure the SMI designated as master, select the following in the LCD menus:
   a. **Communication → RS485-1 Conf →Device Type → *SolarEdge***
   b. **RS485-1 Conf →Protocol → *Master***
   c. **RS485-1 Conf → *Slave Detect***

   The system starts automatic detection of the SolarEdge slave SMI units connected to the master SMI. The SMI should report the correct number of slaves. If it does not, verify the connections and terminations.
4. Verify the connection of the master to the SolarEdge monitoring server, as described in*Verifying the Connection* on page 51.

Verifying the Connection

After connecting and configuring a communication option, perform the following to check that the connection to the monitoring server has been established successfully.

To verify the connection:

1. Turn ON the PSU and the SMI ON/OFF switch.
2. Switch the AC to the inverter ON (as described in its manual). If applicable, turn the inverter DC Safety Switch to ON.
3. Wait for the SMI to connect to the SolarEdge monitoring server. This may take up to two minutes.

   A message similar to the following appears on the LCD panel:

```
Vdc[v]  Idc[a]  Pdc[w]
14.1    ---.-   ------
P_OK:  014/014  <S_OK>
           OFF
```

S_OK: Indicates that the connection to the SolarEdge monitoring server is successful.

If S_OK is not displayed, refer to *Errors and Troubleshooting* on page 53.

Additional Connection Options

Creating a Wireless ZigBee Connection

This communication option enables using a ZigBee connection to connect one or several SMIs to the SolarEdge monitoring portal.

The ZigBee device is provided with a user manual, which should be reviewed prior to connection. It is available on the SolarEdge website at http://www.solaredge.com/groups/products/communication (under ZigBee).

Creating a Wi-Fi Connection

This communication option enables using a Wi-Fi connection for connecting the inverter to the SolarEdge monitoring portal.

The Wi-Fi kit can be purchased separately and assembled during system installation. The Wi-Fi kit is provided with a user manual, which should be reviewed prior to connection. It is available on the SolarEdge website at http://www.solaredge.com/groups/products/communication (under Wi-Fi).

Appendix A: Errors and Troubleshooting

This appendix describes the error messages that appear on the LCD panel when an error occurs, and how to troubleshoot them.

Troubleshooting Communication - S_OK is Not Displayed

If S_OK is not displayed, perform the following:

To troubleshoot Ethernet communication:

When Ethernet communication is used, the **Server Communication Status** window can be used to identify the location of the error:

```
Server:LAN      <S_OK>
Status:           <OK>
xxxxxxxx
<Error Message>
```

xxxxxxxx is a string of 1s and 0s showing an eight-bit communication connection status. 1 indicates OK and 0 indicates an error. The possible errors and their troubleshooting are detailed in the following table:

Bit Location	Error Message	Error Description	Troubleshooting
1st	LAN Disconnected	An Ethernet physical cable connection fault: The Ethernet link or physical Ethernet cable are not connected properly	Check the cable pin-out assignment and cable connection. Refer to *Creating an Ethernet (LAN) Connection* on page 44
2nd	DHCP Failed, or Invalid DHCP Config	The SMI failed to get a valid IP address from the DHCP server, or The DHCP/static IP settings in the SMI are not the same as those of the router.	Check the router and SMI configuration. Consult your network IT.
3rd	Gateway Ping Failed	The connection to the router is not available: Ping to the first local switch/router failed (LAN error)	Check the physical connection to the switch/router. Check that the link LED at the router /switch is lit (indicating phy-link). If OK - contact your network IT, otherwise replace the cable or change it from cross to straight connection.
4th	G Server Ping Failed	The connection to the Internet is not available: Ping to google.com failed	Connect a laptop and check for internet connection. If internet access is unavailable, contact your IT admin or your internet provider. For W-IFI networks, ensure that username and password are as defined in the internet provider AP/router.
5th	Server x Ping Failed	Ping to redundant server #x failed	Check the SolarEdge server address, under **LAN Conf** submenu: Address: prod.solaredge.com Port: 22222 Check with your network administrator whether a firewall or another device is blocking transmission.
6th			
7th			
8th	Tcp Connect. Failed	The connection to the SolarEdge server was not established: Communication with the server failed	

To troubleshoot RS485 communication:

1. If after slave detection the number of slaves reported in the master is smaller than the actual number of slaves, check the Server Communication status screen of every slave. The following should appear:

```
Server:RS485
Status:          OK
```

2. If the message **Master Not Found** appears, the master device is not responsive or the RS485 cable is not connected. Check the connections to the master device and fix if required.

Additional Troubleshooting:

1. Check that the modem or hub/router is functioning properly.
2. Check that the connection to the internal connector on the communication board is properly done.
3. Check that the selected communication option is properly configured.
4. Use a method independent of the SolarEdge SMI to check whether the network and modem are operating properly. For example, connect a laptop to the Ethernet router and connect to the Internet.
5. Check whether a firewall or another type of network filter is blocking communication.
6. For ZigBee troubleshooting, refer to the ZigBee installation manuals.

Error Codes

The error messages include an error number and a description, and have the following format:

```
Error code XXX
XXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXX
```

An error message is displayed for 30 seconds. If the error no longer exists, the SMI displays the Wake Up message.

WARNING!

All Warnings and Cautions in this manual should be adhered to while troubleshooting an error.

Error #	LCD Message	Description	Troubleshooting
15	DC Voltage Too High	DC overvoltage. The DC voltage exceeds the maximum supported level.	The SolarEdge system normally eliminates DC overvoltage errors: When DC overvoltage is detected, the SMI shuts off the power optimizers and restarts. If the fault persists: ○ Turn OFF the SMI ON/OFF switch. If after five minutes, the LCD panel does not show a low safety voltage (1V per power optimizer), check which string is malfunctioning and recheck its connection to the combiner box. ○ Verify that no PV modules are connected directly in the string without a power optimizer. ○ Re-commission all SMIs in the site, as described in *Commissioning the Safety and Monitoring Interface* on page 22.
17	Temperature Too High	Over temperature.	If the fault persists: ○ Verify that proper clearance exists around the SMI. ○ Check whether the SMI is installed in an area with temperatures outside its operating range. ○ Re-install in a cooler location.

Error #	LCD Message	Description	Troubleshooting
24	Faulty Temp. Sensor	Broken or unconnected temperature sensor.	If the fault persists, contact SolarEdge Support.
27	Hardware Error	Internal hardware error.	If the fault persists, contact SolarEdge Support.
43	Internal HW Error	Internal hardware error.	If the fault persists, contact SolarEdge Support.
4, 5, 8, 12,18-23, 39, 42, 45	SW Error	Internal software error.	If the fault persists, contact SolarEdge Support.

Appendix B: SMI Specifications

Mechanical Specifications

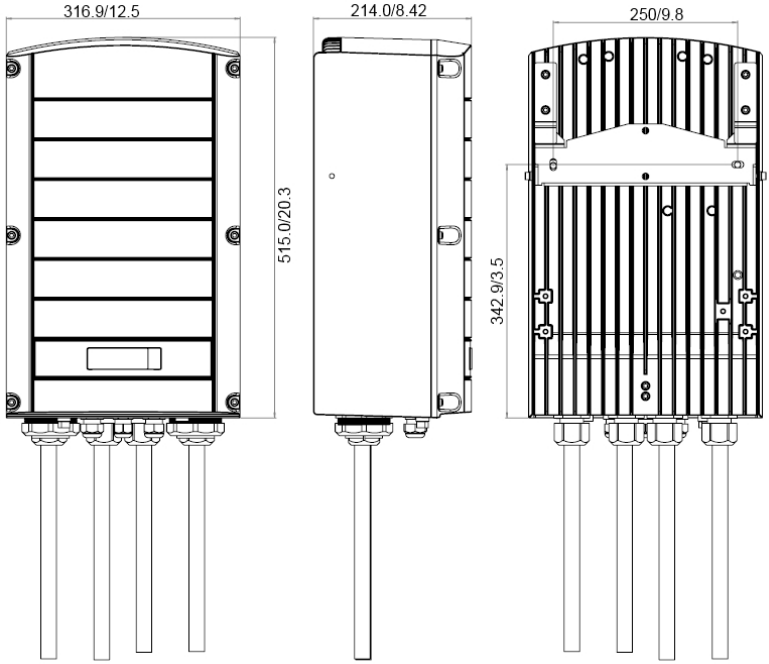


Figure 33: SMI vertical mounting - front, side and rear views (mm / in)

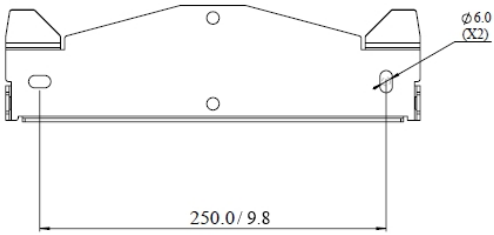


Figure 34: Vertical mounting bracket dimensions

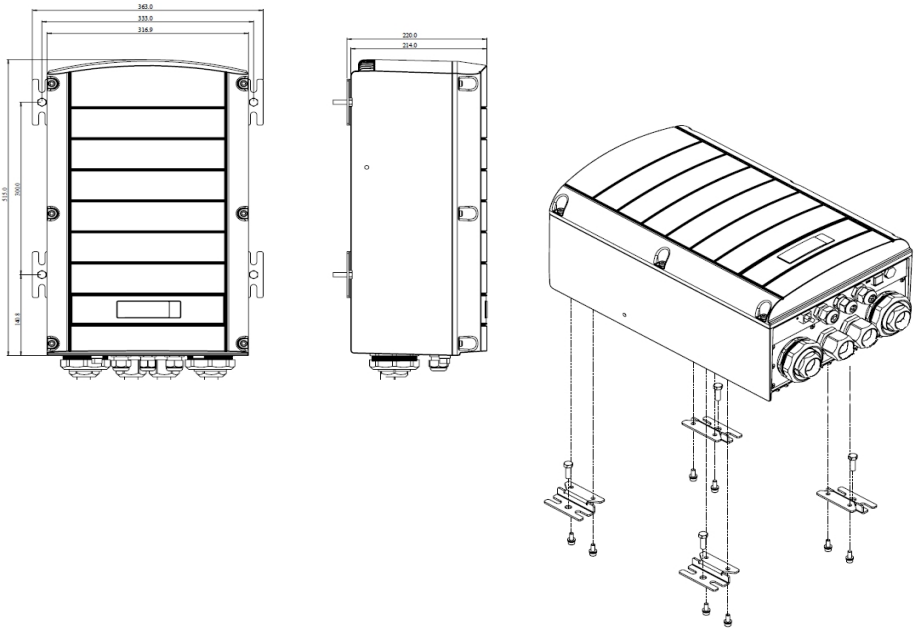


Figure 35: SMI horizontal mounting - front, side and isometric views

Technical Specifications

DC Input		Units
Number of DC Inputs	1	
Input Type	PG29 x 2	
Maximum Voltage	1000	VDC
Maximum Continuous Current	180 (MI: 160)	A
Lightning Protection	Yes	
Overvoltage Category Rating	OVC2	
Altitude Rating	2000 / 6570	m/ft
Temperature rating of the connected wire - PV & PSU	90 / 194	C°/F°
DC Output		
Number of DC Outputs	1	
Output Type	PG29 x 2	
Maximum Voltage	1000	VDC
Maximum Continuous Current	180 (MI: 160)	A
Lightning Protection	Yes	
Operating Power (External power supply)		
Input Voltage	36 – 55	VDC
Nominal Power Consumption	12	W
String Design		
String Length	Module & Inverter Dependent	
Maximum Number of Input Strings (using an external combiner box)	24	
Maximum Number of Power Optimizers	550	
Additional Features		
Display	LCD & LED for Full Status Review	
Remote Monitoring	Yes	
Module Safety DC Voltage	Yes	
On-site Master Shutdown	Yes	
Supported Communication	2 x RS485, RS232, Ethernet, ZigBee (optional)	
Standard Compliance		
Emissions	IEC61000-6-2, IEC61000-6-3, IEC61000-3-11, IEC61000-3-12, FCC part 15 class A	

Safety	IEC-62109, UL1741, C22.2 No.107.1	
Installation Specifications		
Dimensions (W x D x H)	317 x 214 x 540 / 12.5 x 8.4 x 21	mm/in
Weight	25 / 55	kg/ lb
Operating Temperature Range	-20 to +60 / -4 to +140	°C/°F
Protection Rating	IP66	
Relative Humidity	0 to 100	%
Input Wiring Gauge	35 to 105	mm^2
Output Wiring Gauge	35 to 105	mm^2
Storage Temperature Range	-40 to +85 / -40 to +185	°C/°F
Storage Humidity Range	0 to 95	%

If you have technical queries concerning our products, please contact our support through SolarEdge service portal:
http://www.solaredge.com/groups/support/services

North America	(Toll free) 1877 360 529 2
Australia	(Toll free) 1800 46 55 67
Germany	089 454 597 30
France	(Toll free) 0800 917 410
Italy	(Toll free) 800 784 824
Japan	(Toll free) 81 3 5530 9360
United Kingdom	(Toll free) 0800 028 1183
Belgium	(Toll free) 0800 730 41
Israel	073 240 311 8
Rest of world	972 (0) 73 240 311 8
Fax	972 (0) 73 240 311 7
Email to:	support@solaredge.com

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